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IS 13799 (1993): Polyurethane Base Surfacer (Two Pack) for Exterior Painting of Railway Coaches [CHD 20: Paints, Varnishes and Related Products]



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Indian Standard

POLYURETHANE BASE SURFACER
(TWO PACK) FOR EXTERIOR PAINTING OF
RAILWAY COACHES — SPECIFICATION

UDC 667'637'8 : 667'621'633 : 678'664 : 625'2

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NEW DELHI 110002

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Industrial Paints Sectional Committee had been approved by the Chemical Division Council.

High performance coatings based on synthetic polymers are a recent development. Polyurethane coating systems being the most recent addition, are probably the best available system for corrosion protection of steel. It is also the economical among other anti-corrosion coatings. It not only wards off corrosion but also fortifies the steel against chemical attack and physical damage.

The use of polyurethane paints presents a two-fold potential hazard such as toxic and fire hazards. The safety precautions must be taken in handling and painting of these materials (*see* Annex E).

The committee responsible for preparation of this standard is given in Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

POLYURETHANE BASE SURFACER (TWO PACK) FOR EXTERIOR PAINTING OF RAILWAY COACHES — SPECIFICATION

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for two pack polyurethane surfacer intended to be used for the protection of exterior of railway coaches, diesel and electric locomotive against atmospheric corrosion.

1.1.1 It is primarily suitable for application by spraying. It may also be applied by brush for touching-up small areas.

1.1.2 The material is intended to be used as a surfacer in polyurethane paint system over a primed surface and a two component unsaturated polyester based polyurethane knifing filler for the protection of exterior of railway coaches, etc. The material shall be used after the surface imperfection are well covered with a two-component polyurethane knifing filler. The surfacer is used with the object of getting a smooth, uniform, and non absorbent base for the finishing enamel.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 1303 : 1983 and the following shall apply.

3.1.1 Component

Each of the two parts of the paint which when mixed together, forms a pigmented polyurethane paint.

3.1.2 Paint

The mixture of the two components in the proportion recommended by the manufacturer.

4 REQUIREMENTS

4.1 Composition

The paint shall consist essentially of two components, surfacer and hardner or catalyst solution to be mixed in such simple proportion to satisfy all the requirements of this standard.

4.1.1 Surfacers shall consist of i) an appropriate polyol, and ii) pigments, extenders, solvents and additives.

4.1.2 Hardner or catalyst solution shall consist of i) an aromatic polyisocyanate, and ii) solvents and additives.

NOTE — To determine whether the polyisocyanate is aliphatic or aromatic in nature, the test shall be carried out as prescribed in Annex B.

4.2 The material shall also comply with the requirements given in Table 1.

5 TESTS

5.1 Unless specified otherwise, tests shall be conducted as prescribed in IS 101. References to the relevant parts and sections of that standard are given in column 5 of Table 1.

5.2 The preparation of metal panels shall be as per IS 101 (Part 1/Sec 3) : 1986.

5.3 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (see IS 1070 : 1992) shall be employed.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

5.4 The two component polyurethane surfacer shall be mixed in the ratio recommended by the manufacturer of the paint before conducting the test or tests. Where the surfacer is required to be applied on panels, it shall be done so by using suitable spraying apparatus.

5.5 The spray gun shall be thoroughly cleaned before use. Correct size of nozzle and air-cap shall be fitted to it. The air-pressure shall be adjusted in accordance with the viscosity of the material to be sprayed. An even and uniform coat having a dry film thickness of minimum 35 microns has to be obtained. The film thickness shall be determined by the method prescribed in Annex C.

6 PACKING AND MARKING

6.1 Packing

Unless otherwise agreed to between the purchaser and the supplier, the material shall be packed in metal containers conforming to IS 1407 : 1980 and IS 2552 : 1989.

6.1.1 Each component as delivered shall be free of gel, coarse particles, skins, foreign matter and sediments. Any sediment that does form must be easy to stir up again with power/mechanical stirrer in order to give a homogeneous paint. However, rise in temperature shall not be more than 5°C.

Table 1 Requirements for Polyurethane Surfacer (Two Pack)
(Clauses 4.2 and 5.1)

Sl No.	Characteristic	Requirement	Methods of Test	
			Annex	Ref to Part/Section of IS 101
(1)	(2)	(3)	(4)	(5)
i)	Drying time		—	Part 3/Sec 5 : 1987
	a) Surface dry, <i>Max</i>	30 min		
	b) Hard dry, <i>Max</i>	6 h		
	c) Hard dry, 70°C <i>Max</i>	30 min		
ii)	Consistency	a) Smooth and uniform and suitable for spray application b) 20 seconds for air-spray and 40 seconds for air-less spray	—	Part 1/Sec 5 : 1989
iii)	Finish	Smooth and matt	—	Part 3/Sec 4 : 1987
iv)	Colour	White or tinted to the desired colour	—	Part 4/Sec 2 : 1989
v)	Dry film thickness, <i>Min</i>	35 microns for air-spray and 40 microns for air-less spray	C	—
vi)	Volume solids, <i>Min</i>			Part 8/Sec 6 : 1993
	a) air spray	35 percent		
	b) air less spray	40 percent		
vii)	Scratch hardness (1 500 g)	No such scratch as to show bare metal	—	Part 5/Sec 1 : 1988
viii)	Flexibility and adhesion	No visible damage or detachment of film	—	Part 5/Sec 2 : 1988
ix)	Flash point, surfacer and hardner each	Above 20°C	—	Part 1/Sec 6 : 1987
x)	Fineness of grind	35 microns	—	Part 3/Sec 4 : 1987
xi)	Pot life, <i>Min</i>	2 hours	D	—
xii)	Mass in kg/10 l	12	—	Part 1/Sec 7 : 1987
xiii)	Keeping properties	Not less than one year	—	Part 6/Sec 2 : 1989

6.2 Marking

Each container shall be marked with the following:

- Name of the material with component's name,
- Indication of the source of manufacture,
- Volume of the material,
- Month and year of manufacture,
- Mixing proportion recommended for use, and
- Other instructions for safe handling and use of the material.

7 SAMPLING

7.1 Representative samples of the material shall be drawn as per 6 of IS 101(Part 1/Sec 1) : 1986.

7.2 Criteria for Conformity

7.2.1 Drying time and dry film thickness shall be tested on at least 2 samples taken from 2 different containers selected as per 7.1. For lot size above 1 000 kg, this shall be minimum 3. For the rest of the characteristics, tests shall be conducted on one composite sample prepared from individual samples taken from different containers in the sample.

7.2.2 There shall be no failure in respect of any test if the lot is to be considered conforming to the requirements of this standard.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
101 (Part 1)	Methods of sampling and tests for paints, varnishes and related products : Part 1 Tests on liquid paints (general and physical),
Sec 1 : 1986	Section 1 Sampling (<i>third revision</i>)
Sec 3 : 1986	Section 3 Preparation of panels (<i>third revision</i>)
Sec 5 : 1989	Section 5 Consistency (<i>third revision</i>)
Sec 6 : 1987	Section 6 Flash point (<i>third revision</i>)
Sec 7 : 1986	Section 7 Mass per ten litres (<i>third revision</i>)
101 (Part 3)	Methods of sampling and tests for paints, varnishes and related products: Part 3 Tests on paint film formation,
Sec 4 : 1987	Section 4 Finish (<i>third revision</i>)
Sec 5 : 1987	Section 5 Fineness of grind (<i>third revision</i>)
101 (Part 4/ Sec 2) : 1989	Methods of sampling and tests for paints, varnishes and related products: Part 4 Optical tests on paint films, Section 2 Colour (<i>third revision</i>)
101 (Part 5)	Methods of sampling and tests for paints, varnishes and related products: Part 5 Mechanical tests on paint films,
Sec 1 : 1988	Section 1 Hardness test (<i>third revision</i>)
Sec 2 : 1988	Section 2 Flexibility and adhesion (<i>third revision</i>)
101 (Part 6)	Methods of sampling and tests for paints, varnishes and related products: Part 6 Durability tests on paint films,
Sec 1 : 1988	Section 1 Durability under conditions of condensation (<i>third revision</i>)
Sec 2 : 1989	Section 2 Keeping properties (<i>third revision</i>)
101(Part 8/ Sec 6) : 1993	Methods of sampling and tests for paints, varnishes and related products: Part 8 Tests for pigments and other solid, Section 6 Volume solids
1070 : 1992	Reagent grade water (<i>third revision</i>)
1303 : 1983	Glossary of terms relating to paints (<i>second revision</i>)
1407 : 1980	Round paint tins (<i>second revision</i>)
1745 : 1978	Petroleum hydrocarbon solvents (<i>second revision</i>)
2552 : 1989	Steel drums (galvanized and ungalvanized) (<i>third revision</i>)

ANNEX B

(Clause 4.1.2)

METHOD OF IDENTIFYING AROMATIC AND ALIPHATIC ISOCYANATES**B-0 GENERAL**

B-0.1 Aliphatic polyisocyanates show no colouration while aromatic polyisocyanates show a light brown to a dark reddish brown colouration with hydrogen peroxide.

B-1 REAGENTS**B-1.1 Acetone****B-1.2 Hydrogen Peroxide 3 Percent Solution in Acetone****B-2 PROCEDURE**

B-2.1 Prepare an approximately 40-50 percent solution of the polyisocyanate in acetone. To 50 ml of this solution, stir 1 ml of 3 percent hydrogen peroxide solution. Allow it to stand for 5-10 min.

B-2.2 The development of any light brown to a dark reddish brown colour indicates aromatic polyisocyanates. No colour indicates aliphatic polyisocyanates.

ANNEX C

[Table 1, Sl No. (v)]

DETERMINATION OF PAINT FILM THICKNESS

C-0 GENERAL

C-0.1 This specifies non-destructive methods for determining the thickness of dry paint films on metallic substrates. It is, therefore, primarily intended for use in checking the thickness of paint films on painted articles.

C-1 APPARATUS

C-1.1 Electromagnet

This type of instrument, requires a supply of electrical

power and incorporates means of stabilizing the supply to an electromagnetic head.

C-2 PROCEDURE

C-2.1 The head is placed on an unpainted metal surface similar in nature to that bearing the paint film under test. A reading is taken and the operation repeated on the painted surface. The scale on the instrument is calibrated to indicate the thickness of the paint film shown by the difference between two readings.

ANNEX D

[Table 1, Sl No. (xi)]

DETERMINATION OF POT LIFE

D-1 GENERAL

D-1.1 The time taken to double the viscosity from the original value shall be considered as the pot life of the material.

D-2 PROCEDURE

D-2.1 Thoroughly mix component parts in the ratio

specified by the paint manufacturer to give a sample of 200 ml by volume.

D-2.2 Within 10 minutes of mixing (**D-2.1**) determine the viscosity as prescribed in IS 101 (Part 1/Sec 5) :1989.

D-2.3 Allow the mixed sample of paint to stand in a suitable air-tight container and determine the viscosity at the end of the specified time.

ANNEX E

(Foreword)

HEALTH HAZARDS AND SAFETY MEASURES

Use of polyurethane paints generally presents a two-fold potential hazard, toxic hazards and fire hazards.

Toxic effects through the lungs and the skin occur frequently in the industrial usage of paints. The best guide of comparative values of ingestion toxicity is the LD 50 value. It refers to the lethal doses of toxic substance which can kill 50 percent of one class of animal in test. The LD 50 value for polyisocyanates is much lower when compared to the LD 50 value of cyanides.

Another guide of comparative values of inhalation is the threshold limit value (TLV). The TLV for monomeric di-isocyanates has been fixed up at 0.02 ppm. Therefore,

spraying of polyurethane paints calls for safety precautions in the form of proper ventilation, proper exhaust facilities and hand gloves for the spray painters. However, it would be an ideal painting practice to go in for proper spray booth.

As far as fire hazards are concerned, all solvents based paints are known for their fire-risks. This can be eliminated by providing good ventilation so as to avoid vapour air mixture which are flammable and also by not exposing the paint vapours to sources of static electricity, sparks or flames.

The polyurethane coatings are as safe to handle as any other solvent based paints, provided general industrial hygiene principles are followed.

ANNEX F*(Foreword)***COMMITTEE COMPOSITION****Industrial Paints Sectional Committee, CHD 031***Chairman*

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